# SFWMD Responses to FDEP Comments on July 15, 2002 Draft of the Loxahatchee MFL Technical Criteria Document

## SFWMD Staff Responses to Technical Comments

1. This issue is addressed in the revised document. The flow analysis used to develop the MFL criteria were based upon best available information. There is a good amount of data available from the 1980-81, 1985 and 1989-90 drought periods where we have concurrent flow data from all of the tributaries. Comparison of actual data collected from the river during these low flow periods with those values used in the hydrodynamic model show good agreement. For example, the percent of flow contributed by the Lainhart Dam to the NW Fork used in the model was 44%. This compares with field measurements that show the Lainhart Dam to provide 45% of the flow for the 1980-81 drought dry season, 46% from the 1980-81 drought wet season, 40% from the 1989-90 drought dry season, and 56% from the 1989-90 drought wet season. Based on these data, the flow ratio of 44% provided in the model appears as a reasonable ratio for estimating the flow contribution provided by the Lainhart Dam and other tributaries during dry periods, the period of time that would be of most interest in setting the MFL.

   The District has recently completed a contract with the USGS to update and improve the current flow/salinity monitoring program within the watershed. Additional flow gages and salinity monitoring instruments are being installed in Cypress Creek and Hobe Grove Ditch. These additional gages will provide the data needed to more fully understanding the role that these tributary basins play in shaping the river's salinity profile.

2. There are a number of acceptable methods to conduct field surveys of floodplain vegetation. A floodplain cross-section transect is one approach if the intent is to document the range of communities that exist at a particular point. The belt quadrat approach used in this study was designed to allow comparison of areas within the floodplain that had approximately equal exposure to flooding and drying caused by river water level. A more random sampling approach to locating sites within the floodplain is appropriate from a population that can be assumed to have a normal distribution. In this case, sites were located selectively, rather than randomly, to represent areas that were not obviously influenced by structural features of the floodplain. This protocol is clearly explained in the Methods section of the report. Again, these data represent best available information. We are not aware of more recent data conducted along the river corridor other than the Ward & Roberts (unpublished) vegetation surveys conducted in 1993.

3. As explained in the report, this was a preliminary effort to obtain background information that could be used to develop a more comprehensive soil/salinity monitoring program. In response to FDEP's comment, in an ideal world, every vegetation survey point would have had associated detailed topographic survey data as well as soil salinity data, descriptive soil profiles, and soil chemistry analyses. Our ability to collect and analyze soil samples was limited by both staff time and budget. As a result, only a few samples could be collected and analyzed for the most basic indicators of saltwater influence. The soil salinity sites were selected to corresponded to plant survey sites at selected points in the river that we hoped would best represent the range of salt influence from frequent exposure to infrequent exposure. A much more comprehensive look at soil salinity is warranted, including intensive

sampling at a range of depths at frequent intervals, especially during dry periods, to account for the fact that salt may only be detectable in the soil when salinity is high in the river and may be rapidly removed from surface soils when freshwater flows in the river increase. In Chapter 6 we discuss future monitoring and research efforts designed to obtain better soil salinity information along the river corridor.

Questions 4, 5 & 6

Figure 19 has been modified illustrate average annual flows from Lainhart Dam rather than from G-92. This figure was placed in the report at the request of Tom Swihart. The purpose of Figure 19 is to represent decadal differences in freshwater flow patters, i.e. to compare flow conditions in the 1970's with the 1980' and 1990's. It seems reasonable therefore to compare data from the 70's and 1980's as "historical" and data from the 1990's as "current." Another approach that could have been used, of course, was to use 1987 as the divide point, as you suggest. Still another approach may have been to use 1983 or a 1985 as the divide point (before and after wild and scenic river designation), or 1979 (before and after the consent decree). As noted, there were significant differences in rainfall patterns between the 1970s, 1980s, and 1990s and the increases in rainfall during the latter decades may have been responsible for the observed overall increase in average flows to river during this period. This issue is discussed in Chapter 2, Figure 4 and in Chapter 5. The more critical issue from our perspective, as noted in FDEP's comment, is that the incidence of very low flow events has not improved substantially during this period. As shown in Table 24, the occurrences of flows less than 20 cfs and less than 10 cfs have remained approximately the same. Table 24 shows that during the 1990s flows less than 35 cfs occurred 25% of the time, as reflected in 73 events, with an average duration of 15 days and a return frequency of two months. Although we did not do the math to determine exactly how many violations of the proposed MFL criteria this represents, we felt it was safe to assume that, on average, we could expect that the proposed MFL criteria were probably exceeded 4-6 times per year. Under the proposed criteria, flow rates below 35 cfs for 20 days duration, would only be allowed to occur once ever six years.

The conclusions presented in the report was not that the resource had not been harmed by current flow conditions, but rather that recent flow conditions have not caused noticeable further degradation of the resource, relative to conditions that existed in 1985, the point in time when the river was designated as Florida's first Wild and Scenic river. A section of the river has been identified in the report that is presently experiencing significant harm, due to the effects of historical and current flow conditions. Again, these conclusions are based on best available data.

7. Table 25 is based on analysis of routine water quality sampling data that is collected periodically by LRED. As they mention in their report, the 'Wild and Scenic" segment of the river contains one downstream station that is often estuarine in character and frequently has elevated salinities. Nevertheless, comparison of the 1998-2001 drought years, with historical average conditions, indicates significantly higher salinities. Unfortunately a comparison was not provided with historical drought periods, such as may have occurred in 1971, 1981 and 1989. The District's contention that impacts to the river have remained relatively stable since 1985 was based on assessment of floodplain the vegetation communities recorded in this study, vegetation maps provided in the FDNR 1985 Wild and Scenic River EIS, and a FDNR

1993 survey of the river. Comparison of these vegetation maps are provided in the revised final draft.

8. We agree with all of these points and have tried to insert the appropriate qualifying text in the document.

9. The estimates of consumptive use are based on several sources of information. This includes the amount of water allocated in consumptive use permits, the amount of water that is reported to be used by utilities, estimates of water use based on land use type and weather conditions, and estimates of water use provided by the USGS. If there are other more appropriate sources of information available that should included within the document, we are not aware of this information. In response to a number of consumptive use questions posed by FDEP staff, the District agreed to conduct additional modeling to provide a more definitive answers to these questions. The MODFLOW modeling effort was designed to provide a general indication of relationships between surface and ground water as a means to develop an integrated approach to assessing cumulative impacts of water withdrawals in the basin. At this point in time, this model represents the best tool we have to address this type of question. The information contained in Appendix I was revised after copies were provided to FDEP. The new revised version includes a discussion of the accuracy of the model and indicates a difference of up to approximately 10 cfs, of which about 50% is attributed to consumptive use withdrawals by major utilities.

10. We agree with FDEP comments that this reference provides only a generalized description of vegetation habitats. Appropriate qualifying information will be placed in the document.

11. We agree that a range of species and characteristics needs to be considered in terms of monitoring the overall health of the community and determining both long-term and short-term impacts and restoration needs of the system. A more comprehensive study and monitoring program is warranted within the watershed. A summary of proposed future research projects is provided in Chapter6, in the section entitled *Research Needs.* This particular suite of vegetation monitoring parameters was chosen because it was felt that they were best suited to determination of significant harm that takes more than two years for recovery to occur.

12. Results from a number of different tools and types of analyses were combined to address these issues and develop management criteria. Figure 32 shows that, under current operating conditions, salinities of 2 ppt occur infrequently (for 20 days once every six years) at river mile 10.2 and often (several times a year) at river mile 9.2. Results of this model run were analyzed to determine how much flow was needed to prevent salinity at river mile 9.2 from exceeding 2 ppt. This flow was determined as 35 cfs. We proposed therefore, in order to protect the resources at river mile 9.2 from exposure to 2 ppt salinity, that river flows should not be allowed to drop below 35 cfs for more than 20 days, more often than once every six years

    Another analysis was made to determine the long-term average salinity that occurred at river mile 10.2. As shown in Table 34, that long-term average salinity was 0.15 ppt. Therefore we used the model to determine how much flow was needed to provide a similar salinity (0.14 ppt) at river mile 10.2. That flow value, as shown in Table 37 was about 100 cfs. Analysis of flow data from the river (see Figure 19 in the November 2002 report) indicate that during the past decade (1991-2001) the District has provided and average flow of 106 cfs to the river.

However, we did not choose to use the average annual flow as the MFL criterion because a) even though we are already providing 100 cfs annual flow on a continuing basis, the river is still experiencing long periods of low or no flow when salt water can penetrate far upstream into areas that have healthy floodplain swamp communities; and b) use of the annual average as a management criterion allows the potential for too much variability to occur (long periods of no flow can be "balanced" by short periods of high flow) to provide adequate protection for the resource. Therefore we chose to focus on the management of extreme events as the best means to prevent significant harm

13. Evidence presented in this report indicated that these six trees, although they are primarily freshwater species, can tolerate occasional exposure to salt concentrations of 1 ppt and even fewer exposures to salinities of 2 ppt as evidenced by the "exposure history" of the healthy floodplain swamp community that exists at river mile 10.2.

14. This is a significant misinterpretation of the intent of the analysis presented in this section. We attempted to analyze the conditions that exist at river mile 10.2 in terms of a number of different criteria related to salinity exposure, including the duration of exposure to various salinity levels and the elapsed time between exposure events, and the average salinity conditions

15. As also noted by the peer review panel, information in these tables was in error and has been modified in the revised document.

16. An analysis of this issue has been included in the revised document.

17. This concern has been raised by a number of reviewers. Review of past management practices indicates that this scenario is unlikely to occur except under extreme events. Adequate language to minimize occurrence of these kinds of events needs to be incorporated into the rule during the rule development process,

18. The recovery plan addresses this issue by providing adequate sustained flow through time (by 2006) to prevent increases above 2 ppt salinity, as required by state law.

19. Appendix E is being modified to address these types of concerns.

20. Appendix O has been rewritten to address apparent inconsistencies in the data.

**SFWMD Staff Responses to Specific Editorial Comments**

1. The analysis of resources did not show significant resources that could potentially be impacted by reduction of flow from the North Fork River or from southwest Fork Tributaries. Additional analysis of these resources may be conducted in conjunction with the restoration effort.

2. This problem was fixed in the text.

3. Impacts of excessive flows are beyond the scope of the MFL effort but should be addressed in the development of a practical restoration plan for the river and estuary

4. This is a standard District graphic that serves a number of purposes. There is management consensus that the relationships shown here are appropriate.

5. Reference added to document. Please note that this restoration vision has not been endorsed by our Governing Board, nor has it been fully endorsed by the current restoration effort.

6. We would like to add the 2001 data. We have submitted a request for our modeling section to develop this information when the data set for the SFWMM is next updated.

7. We have included a copy of the state legislation designating this river in the appendices and cited the relevant state law in the document (Ch 83-358, Laws of Florida).

8-9. Details of flow events are provided in Appendix D and are discussed throughout the text. Text in this section was modified to address these comments.

10. Corrections were made in the text

11. We have no data to determine where oysters may have been present in the system historically. The fact that large amounts of material have been removed from the central embayment and the mouth of the river during the past century, suggesting that extensive oyster bars may historically have been present in this area.

12. This text was added to the document.

13. The text was modified in the document to address this issue.

14. The text was modified to address this issue.

15. Text was exchanged on the figure,

16. The text was modified in the report to address this comment.

17. We agree with the ideas expressed in this comment. The text in the document was modified to better explain these relationships. The purpose of the MFL is protect the resource. Water supply and flood control are functions of the resource that need to be considered when the MFL is developed. The effects of the proposed MFL on these functions needs to be assessed as part of the subsequent analysis.

18-19. This information was added to the document.

20. We agree with almost all of the statements in this comment. We are in the process of developing an interactive, groundwater and surface water, watershed modeling tool that can be used to assess the impacts of water withdrawals on river flows. This model will also provide a means to assess cumulative impacts of permits. Results of this work in progress are provided in Appendix I. An effort was made to use the model to predict interactions and then calibrate and verify the output against actual flow and water level data from the basin.

21. Text in the document was modified to address this comment and incorporate parts of the text provided.

22. Text in the document was modified to address this inconsistency. Our best estimates indicate that flows to the river are minimally impacted by groundwater withdrawals. Monitoring is one tool that is used to help estimate the magnitude of these impacts.

23. This section was modified in the document to clarify the intent including some of the text provided in your comment.

24. Comment noted.

25. We have recently obtained a copy of this report and are in the process of analyzing the data for application to the MFL.

26. Text in the document was modified to summarize the types of data available.

27. The total amount of water withdrawal in the basin, based on permit allocations, use data, and estimates derived from models is provided in Chapter 2 and also in Appendix O.

28. Change made to document.

29. An initial estimate of predrainage water conditions was provided in Appendix N. However, it was felt that this analysis was not detailed enough to provide useful information. An initial attempt was made to use the District's Natural Systems model to estimate historical flows from this basin, but the mode l grid (2miles x 2 miles) was considered to be too coarse to provide useful information.

30. Comment noted. Our approach to MFLs is that they are in effect under all conditions, but the levels are maintained or exceeded under most conditions. MFLs become especially relevant during extremely dry periods when there is potential conflict between consumptive uses and the natural system for limited resources. The MFL recovery and prevention strategy is designed to ensure that adequate water is available to meet the MFL criteria and also meet regional water supply needs so that there is no need to compete for water for all rainfall conditions that are less severe than a 1-in-10 year drought.

31. The only data from Russell and McPherson that was used in this table was flow data for the North Fork.

32. We are not aware of any data prior to 1971. If data are available we would like to consider use of this information in the document.

33. Comment noted. The dots represent individual wells. Permits typically are issued to landowners or utilities that operate a number of wells on their property. Thus a single permit may be represented by a cluster of dots in close proximity on the map. Impacts are evaluated for each permit and thus consider the combined effects of withdrawals that occur from all of the wells covered by the permit.

34. The attempt to develop a cumulative analysis of the effects of consumptive uses in the basin is presented in Appendix I. Another analysis of cumulative impacts, using more conventional techniques is presented in Chapter 2. Both methods resulted in an estimate that consumptive water use by the major utilities results in about a 5 cfs reduction in river flow.

35. Information on the timing of withdrawals was provided in Appendix O, indicating that utilities have peak withdrawals during the dry season, that rarely reach or exceed the amount allocated.

36. Spellings of names in this table were corrected. Mangroves are not a typical component of the freshwater VEC community, but their presence in transects should have been noted.

37. Seedlings were described as shorter than breast height (approximately 4 feet) whereas saplings were taller than breast height.

38. The text was changed in response to this comment

39. The text was changed in response to this comment

40. FDEP comments on this issue were incorporated into the document.

41. Comment noted. This figure was removed from the main document but is stil provided in Appendix B.

42. The table in Appendix H was changed in response to this comment

43. Comment noted

44. An additional bullet was added to address dry season flows

45. The relationship of the MFL criteria to the *Stipulation of Consent Decree* is mentioned in Chapter 6 in conjunction with the recovery and prevention strategy

46. Actions that will be taken by the SFWMD in response to MFL exceedances are discussed in Chapter 6 and include both operational and regulatory activities.

47. The text was changed to address this comment.

48. The text was changed to address this comment.

49. The text was changed in response to this comment.

50. The text was modified in response to this comment to clarify relationships among management goals.

51. Text from this comment was added to the document.

52. Text from this comment was added to the document

53. Document text was modified to clarify this apparent discrepancy.

54. Text about relationship with CERP was added to the document. Action steps that describe how restoration will occur are expected to be developed during the coming year for input to next year's budget cycle.

55. Text added to document to address this comment

56. Information from this comment was added to the document

57. Details of this effort will be developed during the next budget cycle after the MFL has been adopted

58-59. Hopefully we have caught all oft the discrepancies in the Table of Contents and cross-references to the appendices.

60. These figures were added to Appendix A.

61. Appropriate disqualifiers have been added to this Appendix to explain the limitations of the modeling approach.

62. This appendix has been rewritten to address a number of discrepancies and inconsistencies

63. These are good suggestions for a completely revised approach to this document. Unfortunately, we do not have time or resources to make these changes now, but will certainly consider this approach in future documents.

64. These errors will be fixed in the document.